

**PAPILIO DEMOLEUS MALAYANUS WALLACE, 1865  
(LEPIDOPTERA: PAPILIONIDAE) ON DAUAN ISLAND, TORRES  
STRAIT, QUEENSLAND AND RECENT CONFIRMATION OF *P. d.*  
*STHENELINUS* ROTHSCILD, 1895 IN THE LESSER SUNDA  
ISLANDS**

TREVOR A. LAMBKIN

*School of Biological Sciences, University of Queensland, St Lucia, Qld 4072*

*(Email: trevor.lambkin@uqconnect.edu.au or t.lambkin@hotmail.com)*

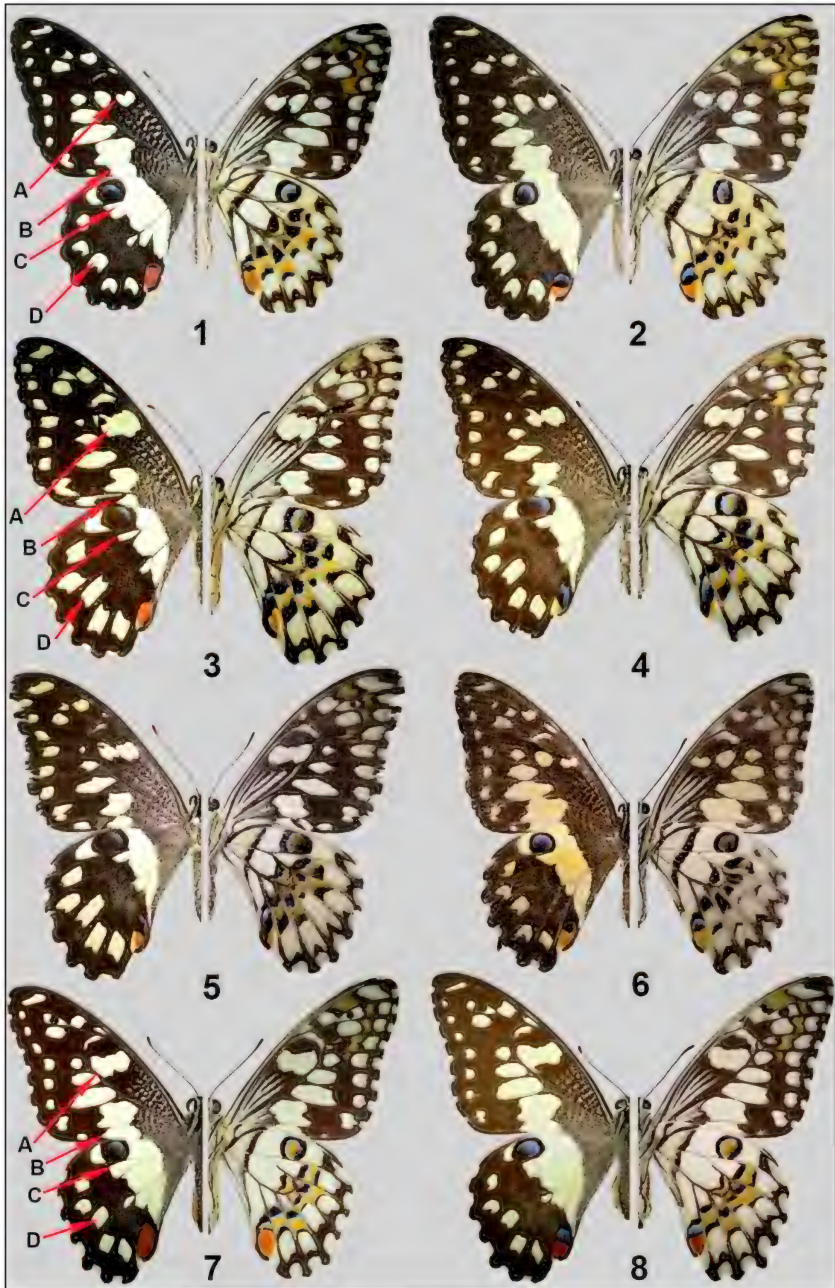
**Abstract**

The lime swallowtail, *Papilio demoleus malayanus* Wallace, 1865, is recorded for the first time in Australia from Dauan Island, Torres Strait, Queensland in 2010. Subsequent reports from January and December 2016 and in January 2017 indicate that it is established on the island, with oviposition observed on *Citrus*. Originally confined to the Malay Peninsula, *P. d. malayanus* has expanded its range eastward since the 1960s. In addition, the current study has confirmed that *P. d. sthenelinus* Rothschild, 1895 is still present on Flores in the Lesser Sunda Archipelago together with *P. d. malayanus*, suggesting that the two taxa might be separate species. The same might be true for *P. d. malayanus* and *P. d. sthenelus*, as biological data presented here supports published molecular data confirming a strong separation between the two taxa.

**Introduction**

The *Papilio demoleus* Linnaeus, 1758 species group, often referred to as the ‘lime swallowtails’, has long been recognised for its distinctiveness within *Papilio* L. (Munroe 1961, Hancock 1983, Smith and Vane-Wright 2008). The group is predominantly tropical with five recognised species: *P. demodocus* Esper, 1799 from the Afrotropics; *P. erithonioides* Grose Smith, 1891, *P. morondavana* Grose Smith, 1891 and *P. grosesmithi* Rothschild, 1926 from Madagascar; and *P. demoleus* from the Indo-Australian region (Smith and Vane-Wright 2008).

Within *P. demoleus*, five subspecies are recognised (Smith and Vane-Wright 2008, Morgun and Wiemers 2012), historically occurring from the Arabian Peninsula to the southeastern part of Papua New Guinea and Australia (Bingham 1905, Corbet and Pendlebury 1978, Common and Waterhouse 1972, Morgun and Weimers 2012, Rothschild 1895). These subspecies form two disjunct groups. In the western group, subspecies *P. d. demoleus* occurred from around the Persian Gulf, through India and Sri Lanka, subtropical China to southern Japan and Taiwan (Smith and Vane-Wright 2008), while subspecies *P. d. malayanus* Wallace, 1865 (Figs 1-2, 6) occurred only in southern Myanmar and the Malay Peninsula (Corbet and Pendlebury 1978). The eastern group contains subspecies *P. d. sthenelinus* Rothschild, 1895 (Figs 3-5) from the Lesser Sunda Islands (*viz.* Alor, Komodo, Flores, Sumba and Sumbawa) (Rothschild 1895, Tsukada and Nishiyama 1982, Smith and Vane-Wright 2008), subspecies *P. d. sthenelus* Macleay, 1826 (Figs 7-8) from Australia (Braby 2000) and subspecies *P. d. novoguineensis* Rothschild, 1908, which is restricted to the area around Port Moresby in Papua New Guinea (Parsons 1998).



The two subspecies that originally occurred from the Arabian Peninsula to Indo-China and the Malay Peninsula, *P. d. demoleus* and *P. d. malayanus*, predominantly utilise ornamental *Citrus* and other Rutaceae as larval hosts, although Smith and Vane-Wright (2008) and van der Poorten and van der Poorten (2016) reported *P. d. demoleus* utilising *Psoralea* and *Cullen corylifolium* (L.) Medik (both Fabaceae) in India and northern Sri Lanka respectively [almost all *Psoralea* names were synonymised into *Cullen* as per Grimes 1997, but some *Psoralea* spp still occur]. In eastern Papua New Guinea and Australia, *P. d. novoguineensis* and *P. d. sthenelus*, respectively, predominantly utilise *Cullen* spp as larval host plants (Parsons 1998, Braby 2000, Morgan and Weimers 2012). The larval host plant of *P. d. sthenelinus* from the Lesser Sunda Is is unknown (Smith and Vane-Wright 2008).

Since the late 1960s, *P. d. malayanus* has undergone a significant range expansion. Rothschild (1895), Bingham (1905), Corbet and Pendlebury (1978) and Common and Waterhouse (1972) indicated that *P. d. malayanus* was once much more restricted in its range, initially and chiefly confined to southern Myanmar and the Malay Peninsula, whereas currently its distribution encompasses the Philippines, Borneo, Indonesia, Timor, New Guinea and the Solomon Islands, plus Europe and the New World (Smith and Vane-Wright 2008, Tennent *et al.* 2011, Morgun and Wiemers 2012, Fernández Hernández and Minno 2015, Nielsen 2017) and now Australia. Smith and Vane-Wright (2008) had speculated on the easterly movement of *P. d. malayanus* and its subsequent impact on the other *P. demoleus* taxa, particularly *P. d. sthenelinus* in the Lesser Sunda Islands.

Here I report the first record of *P. d. malayanus* from Australia, on Dauan Island in Torres Strait, Queensland (a male collected in 2010) and confirm its establishment by 2016. In addition, I confirm the coexistence of *P. d. sthenelinus* with *P. d. malayanus* in western Flores, Indonesia. Finally, differences in final instar larval morphology of *P. d. demoleus* and *P. d. sthenelus* are illustrated and discussed.

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**Figs 1-8.** *Papilio demoleus* subspecies with some diagnostic features arrowed, as per Smith and Vane-Wright (2008), for male uppersides of *P. d. malayanus*, *P. d. sthenelinus* and *P. d. sthenelus*. Arrowed features are: A – large yellow spots in pre-apical area of forewing discal cell; B – forewing medial yellow spots below vein 1A + 2A; C – hindwing medial yellow colour below eye spot; D – hindwing postmedial lunules, spots or bars. Images: *P. d. malayanus* from Australia, *P. d. sthenelinus* after invasion of *P. d. malayanus*; and *P. d. malayanus* from Timor Leste; all figures not to scale; uppersides left, undersides right [forewing lengths, in mm, in square brackets]: (1-2) *P. d. malayanus*, Dauan I., Torres Strait: (1) ♂, 22.iv.2012 [45 mm]; (2) ♀, 24.iv.2012 [42]; (3-5) *P. d. sthenelinus*, Labuan Bajo, W. Flores: (3) ♂, 25.iii.2011 [41]; (4) ♀, 25.iii.2011 [45]; (5) ♀, 3.iii.2016 [47]; (6) *P. d. malayanus*, ♂, Saburai District, Timor Leste, 12.xii.2016 [45]; (7-8) *P. d. sthenelus*: (7) ♂, Wards Hill, E. of Toowoomba, 7.ii.1985 [42]; (8) ♀, Long Pocket, Indooroopilly, 10.xi.1977 [45].

## Methods and materials

The following acronyms refer to public institutions and private collections from which material was examined:

CEMC – C.E. Meyer collection, Brisbane; CGMC – C.G. Miller collection, Lennox Head; MTQ – Museum of Tropical Queensland, Townsville; PRWC – P.R. Wilson collection, Bundaberg; SSBC – S.S. Brown collection, Bowral; TLIKC – T.A. Lambkin and A.I. Knight joint collection, Brisbane.

Abbreviations of collectors' names appearing on specimen labels are:

CEM – C.E. Meyer; CGM – C.G. Miller; IRJ – I. R. Johnson; RPW – R.P. Weir; PRW – P. R. Wilson; SSB – S.S. Brown; TAL – T.A. Lambkin.

Over the period from 2004 to 2016, I surveyed and sampled butterflies on Dauan (seven visits) and Mer Islands (three visits), Torres Strait. In addition, I sampled butterflies at Labuan Bajo, a coastal town situated on the western tip of Flores, Indonesia, from 2010 until 2016, during which, in 2011 and 2016, I collected specimens of *P. demoleus*.

## Results

Several of the upperside diagnostic features which can be used to identify and separate males of the three subspecies *P. d. malayanus*, *P. d. sthenelinus* and *P. d. sthenelus* are arrowed in Figs 1, 3 and 7 respectively, as per Smith and Vane-Wright (2008).

### *Papilio demoleus malayanus* Wallace, 1865

*Specimens examined.* QUEENSLAND: TORRES STRAIT: 14 ♂♂, 6 ♀♀: 3 ♂♂, 1 ♀, Dauan Island, 9°25'S 142°32'E, (3 ♂♂) 6.i.2010, 22.iv.2012, 24.iv.2012, (1 ♀) 24.iv.2012, TAL (TLIKC); 1 ♂, same data except: 22-29.i.2016, CEM, SSB, RPW, CGM (CEMC); 4 ♂♂, 1 ♀, same data except: (1 ♂) 21.i.2016, (2 ♂♂) 22.i.2016, (1 ♂) 26.i.2016, (1 ♀) 16.i.2017, CGM (CGMC); 3 ♂♂, 3 ♀♀, same data except: (3 ♂♂, 1 ♀) 22-29.i.2016, (2 ♀♀) 14-20.i.2017, SSB (SSBC); 2 ♂♂, 1 ♀, same data except: 3-10.iii.2016, IRJ and PRW (MTQ); 1 ♂, same data except: 9°24'41"S 142°32'12"E, WGS 84, 6.iii.2016, PRW (PRWC).

INDONESIA: FLORES: 3 ♂♂, Labuan Bajo, W. Flores, Lesser Sunda Islands, 8°29'30"S 119°53'11"E, 3.iii.2016, 6.iii.2016, 5.xi.2016, TAL (TLIKC).

TIMOR LESTE: 1 ♂, Saburai District, 900 m, 9 km SSW of Maliana, 12.xii.2016, TAL (TLIKC).

### *Papilio demoleus sthenelus* Macleay, 1826

*Specimens examined.* MAINLAND QUEENSLAND: 3 ♂♂, 4 ♀♀: 2 ♂♂, Cecil Plains, 22.ix.1977, TAL; 1 ♂, Wards Hill, E. of Toowoomba, 7.ii.1985, TAL; 1 ♀, Mt Crosby, 22.i.1976, TAL; 1 ♀, Long Pocket, Indooroopilly, 10.xi.1977, TAL, from larva, *Psoralea*; 2 ♀♀, Jamboree Heights, Brisbane, 20.i.1980, 21.xii.1980, TAL, from larva (all TLIKC).

***Papilio demoleus sthenelinus* Rothschild, 1895**

*Specimens examined.* INDONESIA: FLORES: 4 ♂♂, 3 ♀♀, Labuan Bajo, W. Flores, Lesser Sunda Islands, 8°29'30"S 119°53'11"E, (3 ♂♂, 1 ♀) 25.iii.2011, (1 ♂, 1 ♀) 26.iii.2011, (1 ♀) 3.iii.2016, TAL (TLIKC).

**Field observations: Dauan Island, Torres Strait, Queensland**

In January 2010 and April 2012, four specimens of *P. d. malayanus* (1 ♂ and 2 ♂♂, 1 ♀ respectively) (in TLIKC) (Figs 1-2) were collected at the western end of the Dauan Island village. The butterflies were collected flying swiftly about a metre above the ground in open areas, a very similar flight pattern to that of *P. d. sthenelus* from mainland Australia (Braby 2000). Four years later the butterfly was observed again in January and March 2016, when 11 ♂♂ and 2 ♀♀ were collected by CEM, CGM, IRJ, PRW and SSB (CEMC, CGMC, MTQ, PRWC and SSBC), and then again in January 2017, when 3 ♀♀ (CGMC and SSBC) were collected. In January 2016, adult butterflies were found to be 'common' in the village, with at least two females observed ovipositing on cultivated *Citrus* sp. in the grounds of the local school (SSB and CEM pers. comms), while in December 2016, I. Johnson (pers. comm.) reported that he observed, on average, four specimens per day and saw females flying around lemon trees.

Sampling of butterflies by the author on Mer Island, in eastern Torres Strait (170 km south-east of Dauan Island) in January 2011, February 2015 and January 2016, failed to locate the species.

**Field observations: Labuan Bajo, Flores, Indonesia**

In March 2011, 4 ♂♂ and 2 ♀♀ of *P. d. sthenelinus* were collected (Figs 3-4), mostly feeding on blossom of *Lantana camara* L. (Verbenaceae). In March and November 2016, 2 ♂♂ of *P. d. malayanus* and 1 ♀ of *P. d. sthenelinus* (Fig. 5) were collected feeding on blossom of *Echinacea purpuria* (Asteraceae). In 2011, females of *P. demoleus* taxa were observed ovipositing on small ornamental *Citrus* plants less than a metre high; it is not known which taxa these were as the adults were not collected.

**Discussion**

Prior to the late 1960s, *P. demoleus* occurred as two well defined groups occurring on the two sides of the Malay Archipelago and separated by approximately 1900 km (Rothschild 1895, Corbet and Pendlebury 1978). Corbet and Pendlebury (1978) commented on how curious 'the hiatus in the distribution of *P. demoleus* in the Malay Archipelago' was, despite the existence of *Citrus* throughout the region. Matsumoto (2002) and Morgun and Weimers (2012) proposed that the spread of *P. d. malayanus* across this hiatus may have been related to deforestation practices and the concurrent expansion of *Citrus*, particularly in the Philippine islands, Borneo, Sumatra and Java.

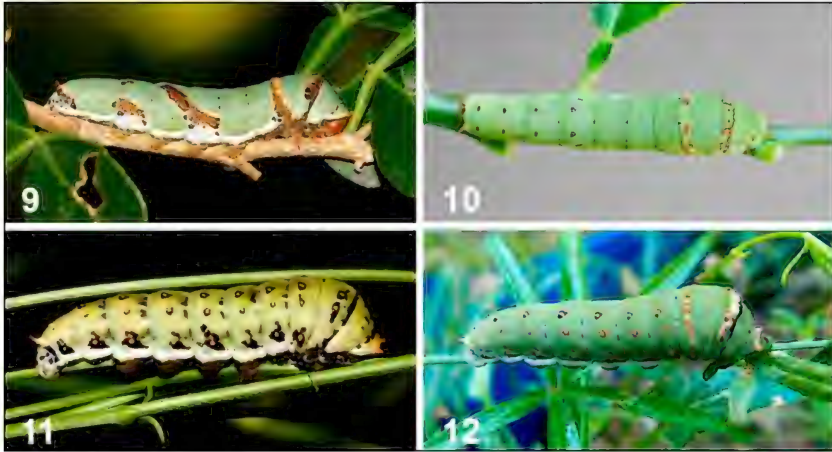
Closer to Australia, Moonen (1999) recorded specimens of *P. d. malayanus* collected in 1997 near Nabire in Papua Province, eastern Indonesia. Then, between 2005 and 2010, *P. demoleus* (more than likely to be *P. d. malayanus*, based on its oviposition on *Citrus*) was recorded from several Provinces in mainland Papua New Guinea (Western, Morobe and Milne Bay), plus New Britain and New Ireland (Tennent *et al.* 2011). More recently, *P. d. malayanus* was reported from the Solomon Islands (Nielsen 2017) and Christmas Island (Braby 2016a). In 2016, *P. d. malayanus* appeared to be established on Dauan Island, where it utilises *Citrus* as a larval host. How far it has spread to other Torres Strait islands is unknown, but it is likely to be on neighbouring Saibai Island, which is just 7 km away and where *Citrus* is common in village gardens.

On the Australian mainland, *P. d. sthenelus* has a wide distribution and is known for its migratory behaviour (Smithers and McArtney 1970, Dell 1977, Braby 2000, Braby 2016b). Its preferred larval hosts appear to be *Cullen* spp (Braby 2000), although Rainbow (1907), Waterhouse (1932) and Braby (2000) reported *P. d. sthenelus* also ovipositing on or utilising *Citrus*. Rainbow (1907) depicted the first illustration of the larva and pupa of *P. d. sthenelus*, on *Citrus* stems. R. Kendall (pers. comm.) reported that in Brisbane, Queensland, larvae of *P. d. sthenelus* are very rarely found on *Citrus* but, when females of *P. d. sthenelus* are confined in a large flight cage, they readily oviposit on fresh *Citrus* growth and larvae develop normally on *Citrus*.

In addition to documenting the first record for Europe, Morgun and Wiemers (2012) illustrated a world map indicating the areas invaded by *P. demoleus*. They also documented the first records of *P. d. malayanus* from the Lesser Sunda Islands and Timor, including the last confirmed records of *P. d. sthenelinus* in Alor (in 1988), Timor (in 1992) and Komodo (in 1997). Certainly, the 2016 record of *P. d. sthenelinus* reported here from Labuan Bajo indicates that *P. d. sthenelinus* appears to be still a viable taxon, with no evidence of it interbreeding with *P. d. malayanus*. The record of *P. d. sthenelinus* occurring on Timor is uncertain as the butterfly was not listed for Timor by Rothschild (1895), Tsukada and Nishiyama (1982) and Mendes and Biva de Sousa (2010), although *P. d. malayanus* is now known from there (Fig. 6). The record of *P. d. sthenelus* collected from Sumba in 1978 and reported and illustrated by Tsukada and Nishiyama (1982) appears to be misidentified, as their illustrated specimen is *P. d. sthenelinus*.

The eastern advance of *P. d. malayanus* has provoked discussion on how subspecies in its path (*i.e.* *sthenelinus*, *sthenelus* and *novoguineensis*) could maintain their viability after the arrival of *P. d. malayanus* (Smith and Vane-Wright 2008). Smith and Vane-Wright (2008) noted that they were ‘about to witness’ a potential ‘natural experiment’ when *P. d. malayanus* spread into the territories of *P. d. sthenelinus* and *P. d. novoguineensis*.

Smith and Vane-Wright (2008) were intrigued to know if the *P. d. sthenelinus* and *P. d. novoguineensis* lineages could stay intact and coexist with *P. d. malayanus*. They noted that if this happened, then it would be reasonable to conclude that *P. d. malayanus*, *P. d. sthenelinus* and *P. d. novoguineensis* all have reached separate species status. Now that *P. d. malayanus* has been in Flores since 1997 (Morgun and Weimers 2012) and *P. d. sthenelinus* still occurs in western Flores (2016), it suggests that these two taxa have maintained separate lineages and thus might be separate species.



**Figs 9-12.** Final instar larvae of *Papilio demoleus* subsp: 9, 11 lateral views; 10, 12 dorsal and dorso-lateral views respectively: (9-10) *P. d. demoleus* on *Citrus*, Sri Lanka; (11-12) *P. d. sthenelus* on *Cullen tenax*, Brisbane, Queensland. Figs 9-10 courtesy of G.M. and N.E. van der Poorten, Sri Lanka; Fig. 11 courtesy of Hongming Kan, Brisbane, Qld; Fig. 12 courtesy of R. Kendall, Brisbane, Qld.

In addition, the molecular data of Smith and Vane-Wright (2008) indicated a possible separation between the Australian taxon *P. d. sthenelus* (Figs 7-8) and *P. d. malayanus* (Figs 1-2). This separation is supported by several life history studies, which show that the final instar larvae of *P. d. demoleus* (Figs 9-10) and *P. d. malayanus* are variable but essentially the same, but are notably different from those of *P. d. sthenelus* (Figs 11-12) (Rainbow 1907, Tan and Khoon 2012, BOIC [Butterflies and Other Invertebrates Club] 2013, Fernández Hernández and Minno 2015, van der Poorten and van der Poorten 2016). The larva of *P. d. sthenelus* has two rows of subdorsal blunt spines, whereas in *P. d. malayanus* these are absent. The larva of *P. d. sthenelus* lacks the diagonal lateral banding on the abdominal segments or banding on the thoracic segments that *P. d. malayanus* possesses, and *P. d. sthenelus* has a row of lateral red spots just below the row of spiracles, which are absent in *P. d. malayanus*. In addition, personal communication with R. Kendall

indicates that larvae of *P. d. sthenelus* are morphologically similar when fed on either *Cullen* (Fig. 13) or *Citrus*.



**Fig. 13.** *Cullen tenax*, Brisbane, Queensland.

Thus, based on the molecular studies of Smith and Vane-Wright (2008), the life history data presented above and the biogeographical data presented here, specifically the coexistence of *P. d. sthenelinus* and *P. d. malayanus*, it is possible that the three *P. demoleus* taxa (*sthenelinus* (Figs 3-5), *sthenelus* (Figs 7-8) and *malayanus* (Figs 1-2)) are separate species. To help elucidate this, a more thorough study and comparison of their biology would be helpful, especially the morphology and colour pattern of final instar larvae of *P. d. sthenelinus*, including its host preference.

Now that *P. d. malayanus* has reached Torres Strait and is poised to enter mainland Australia, and based on the data presented above, it is possible that it will coexist in Australia with *P. d. sthenelus*. If this happens, then it might be further evidence for the valid separation of these two taxa and the recognition of *P. d. sthenelus* as a distinct species.

In addition, if *P. d. malayanus* continues its range expansion into mainland Australia, it presents a potential problem to commercial citrus producers, since *P. d. malayanus* is known to defoliate young *Citrus* trees elsewhere (Morgun and Weimers 2012).

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## References

- BINGHAM, C.T. 1905. *The fauna of British India including Ceylon and Burma: Butterflies Vol I*. Taylor and Francis, London; xv + 511 pp, 10 pls.
- BOIC [Butterfly and Other Invertebrates Club Inc.]. 2013. *Papilio demoleus sthenelus* (Chequered Swallowtail). Available online (accessed 24 Jan 2017): <http://www.boic.org.au/html/gallery/gallerytemplate.html?disp=demoleus%20sthenelus>
- BRABY, M.F. 2000. *Butterflies of Australia: their identification, biology and distribution*. CSIRO Publishing, Collingwood; xx + 976 pp.
- BRABY, M.F. 2016a. *The complete field guide to butterflies of Australia*. Second Edition. CSIRO Publishing, Clayton South; 384 pp.
- BRABY, M.F. 2016b. Migration records of butterflies (Lepidoptera: Papilionidae, Hesperidae, Pieridae, Nymphalidae) in the 'Top End' of the Northern Territory. *Australian Entomologist* **43**: 151-160.
- COMMON, I.F.B. and WATERHOUSE, D.F. 1972. *Butterflies of Australia*. Angus and Robertson, Sydney; xii + 498 pp.
- CORBET, A.S. and PENDLEBURY, H.M. 1978. *The butterflies of the Malay Peninsula*. Third edition, revised by J.N. Eliot. Malayan Nature Society, Kuala Lumpur; 578 pp.
- DELL, B. 1977. Migration of *Papilio demoleus sthenelus* W.S. Macleay (Lepidoptera: Papilionidae) in Western Australia. *Australian Entomological Magazine* **3**: 83-86.
- FERNÁNDEZ HERNÁNDEZ, D.M. and MINNO, M.C. 2015. The slowly expanding range of *Papilio demoleus* Linnaeus (Lepidoptera: Papilionidae) in Cuba. *Tropical Lepidoptera Research* **25**: 8-14.
- GRIMES, J.W. 1997. A revision of *Cullen* (Leguminosae: Papilionoideae). *Australian Systematic Botany* **10**: 565-648.

- HANCOCK, D.L. 1983. Classification of the Papilionidae (Lepidoptera): a phylogenetic approach. *Smithersia* **2**: 1-48.
- MATSUMOTO, K. 2002. *Papilio demoleus* (Papilionidae) in Borneo and Bali. *Journal of the Lepidopterists' Society* **56**: 108-111.
- MENDES, L.F. and BIVA DE SOUSA, A. 2010. Sobre os Rhopalocera de Timor-Leste. Descrição de uma subespécie nova, notas e considerações (Lepidoptera: Papilionoidea). *SHILAP Revista de Lepidopterologia* **38**: 357-377.
- MOONEN, J.J.M. 1999. *Papilio demoleus* L. (Lepidoptera, Papilionidae) in West Irian. *Transactions of the Lepidopterological Society of Japan* **50**: 82-84.
- MORGUN, D.V. and WEIMERS, M. 2012. First note of the lime swallowtail *Papilio demoleus* Linnaeus, 1758 (Lepidoptera, Papilionidae) in Europe. *Journal of Research on the Lepidoptera* **45**: 85-89.
- MUNROE, E. 1961. The classification of the Papilionidae (Lepidoptera). *Canadian Entomologist Supplement* **17**: 1-51.
- NIELSEN, J.E. 2017. A tentative record of *Papilio demoleus malayanus* Wallace, 1865 (Lepidoptera: Papilionidae) from the Solomon Islands. *Australian Entomologist* **44**: 63-64.
- PARSONS, M.J. 1998. *The butterflies of Papua New Guinea: their systematics and biology*. Academic Press, London; xvi + 736 pp.
- RAINBOW, W.J. 1907. *A guide to the study of Australian butterflies*. Wayside Press, Melbourne; 272 pp.
- ROTHSCHILD, L.W. 1895. *Papilio demoleus*. Pp 279-282, in: A revision of the *Papilios* of the eastern hemisphere, exclusive of Africa. *Novitates Zoologicae* **2**: 167-463.
- SMITH, C.R. and VANE-WRIGHT, R.I. 2008. Classification, nomenclature and identification of lime swallowtail butterflies: a post-cladistic analysis (Lepidoptera: Papilionidae). *Systematics and Biodiversity* **6**: 175-203.
- SMITHERS, C.N. and McARTNEY, I.B. 1970. Record of a migration of the chequered swallowtail *Papilio demoleus sthenelus* Macleay (Lepidoptera: Papilionidae). *North Queensland Naturalist* **37**: 8.
- TAN, H. and KHOON, K.S. 2012. *Caterpillars of Singapore's butterflies*. National Parks Board, Singapore; 208 pp.
- TENNENT, W.J., DEWHURST, C.F. and MÜLLER, C. J. 2011. On the recent spread of *Papilio demoleus* Linnaeus, 1758 in Papua New Guinea (Lepidoptera, Papilionidae). *Butterflies (Teinopalpus)* **58**: 30-33.
- TSUKADA, E. and NISHIYAMA, Y. 1982. Papilionidae. In: *Butterflies of the South East Asian Islands, Vol I*. Plapac Co. Ltd, Tokyo; 459 pp.
- van der POORTEN, G.M. and van der POORTEN, N.E. 2016. *The butterfly fauna of Sri Lanka*. Lepodon Books; 418 pp.
- WATERHOUSE, G.A. 1932. *What butterfly is that?* Angus and Robertson, Sydney; x + 291 pp.